

WHAT IS CLAIMED IS:

1. A communications network comprising:

a plurality of network elements connected by links along which data flows between the network elements, and which together protect against link failures between the network elements and failures of network elements which would otherwise disrupt the data flow between the network elements, the plurality of network elements include a first network element; a second network element; a third network element; and a fourth network element; and wherein the links include an active communications link connected between the first network element and the second network element along which the data travels; and a redundant communications link to the active communications link connected between the third network element and the fourth network element along which the data travels, the links include a first protective link connected between the second network element and the fourth network element along which the data received by the second network element is retransmitted to the fourth network element.

2. A network as described in Claim 1 wherein the links include a second protective link connected between the second network element and the fourth network element along which the data received by the fourth of network element is retransmitted to the second network element.

3. A network as described in Claim 2 wherein the second network element and the fourth network element duplicate the data they receive and retransmit it along the first protective link and the second protective link, respectively.

4. A network as described in Claim 3 including a control mechanism connected to the network elements that selects the active communications link to be a primary source of the data for the second network element and the first protective link as the primary source of the data for the fourth network element, wherein the data is synchronized at the second and fourth network elements.

5. A network as described in Claim 4 wherein the control mechanism, when the active communications link fails, reconfigures the second network element to use as its primary source of the data the second protective link and reconfigures the fourth network element to use as its primary source of the data the redundant communications link.

6. A network as described in Claim 5 wherein the fourth network element switches its primary source of the data from the first protective link to the redundant communications link upon instructions from the system controller or detection of failure of the second network element.

7. A network as described in Claim 6 wherein each network element has a line optics card connected to the respective communications link and the working input, and an intra card connected to the respective protective link and the protected input.

8. A network as described in Claim 7 wherein each network element includes a redundant protected selection element which receives the data, and a switch element which processes the data.

9. A network as described in Claim 8 wherein each selection element has a working input connected to the respective

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communications link on which it receives the data from the respective communications link, and a protected input connected to the respective protective link on which it receives the data from the respective protective link.

10. A network as described in Claim 9 wherein each selection element includes a sonet path that supports APS 1 plus 1 redundancy.

11. A method for transferring data on a telecommunications network comprising the steps of:

sending the data from a first network element to a second network element along an active communications link;

sending the data from a third network element to a fourth network element along a redundant communications link to the active communications link; and

sending the data from the second network element to the fourth network element along a first protective link, which protects against communications links failures between the network elements and failures of the network elements which would otherwise disrupt the data flow between the network elements.

12. A method as described in Claim 11 including sending the data from the fourth network element to the second network element along a second protective link.

13. A method as described in Claim 12 wherein the step of sending the data from the second network element to the fourth network element includes the step of duplicating the data by the second network element which the second network element receives,

and the step of sending the data from the fourth network element to the second network element includes the step of duplicating the data by the fourth network element which the fourth network element receives.

14. A method as described in Claim 13 including the step of selecting by a system controller connected to each of the network elements the active communications link to be a primary source of the data for the second network element and the first protective link as the primary source of the data for the fourth network element, wherein the data is synchronized at the second and fourth network elements.

15. A method as described in Claim 14 including the step of reconfiguring by the system controller when the active communications link fails the second network element for the second network element to use as its primary source of the data the second protective link and reconfiguring the fourth network element to use as its primary source of the data the redundant communications link.

16. A method as described in Claim 15 including the step of switching the primary source of the data of the fourth network element from the first protective link to the redundant communications link upon receiving instructions from the system controller or detecting by the fourth network element failure of the second network element.

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